(12) UK Patent Application (19) GB (11) 2 267 865 (13) A

(43) Date of A publication 22.12.1993

(21) Application No 9212640.8

(22) Date of filing 15.06.1992

(51) INT CL[5]
G02B 5/128, B32B 3/18 7/04, E01F 15/00, G09F 13/16

(52) UK CL (Edition L)
B5N N0318 N0330 N0704 N17X N17Y N195 N196 N207 N21Y N223 N255 N257 N2714 N2730 N295 N297 N393 N45X N46X N463 N478 N49X N49Y N501 N502 N515 N517 N537 N543 N55X N564 N569 N572 N604 N615 N661 N666 N672 N695 N696 N70X N71Y N712 N718 N72Y N771 U1S S2281 S2286 S3037

(56) Documents cited
None

(58) Field of search
UK CL (Edition L) B5N, G5C CGAB
INT CL[5] B32B, E01F, G02B, G09F
Online databases: WPI, CLAIMS

(71) Applicant
Storechange Limited

(Incorporated in the United Kingdom)

Moss Rose Mill, Springfield Road, Kearsley, Bolton, BL4 8JW, United Kingdom

(72) Inventors
Andrew Sciama
Douglas Lees

(74) Agent and/or Address for Service
Marks & Clerk
Suite 301, Sunlight House, Quay Street, Manchester, M3 3JY, United Kingdom

(54) Reflective material

(57) A reflective material comprises a carrier layer 2 having a reflective facing 3 to which is bonded a layer of transparent microparticles 4. This microparticle layer is overlaid by a transparent film 6 ultra sonically welded to the reflective facing.

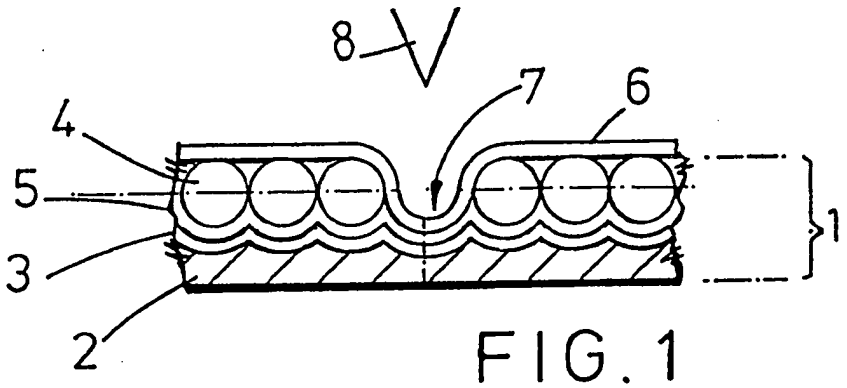

FIG. 1

GB 2 267 865 A

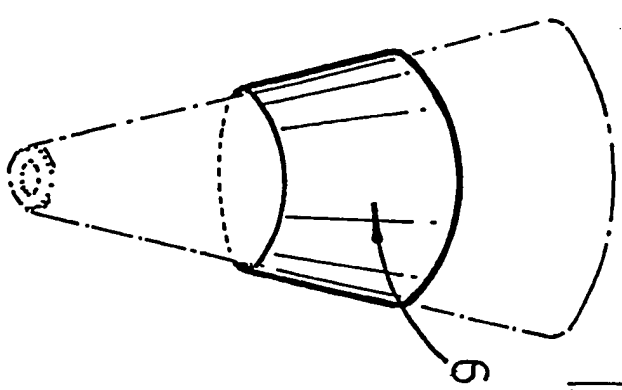

FIG.2

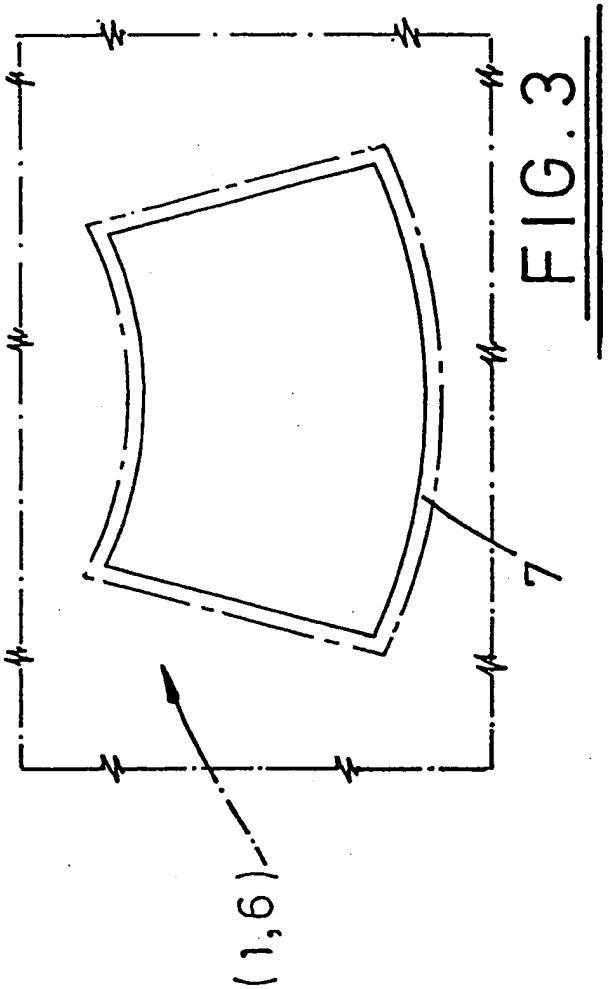

FIG.3

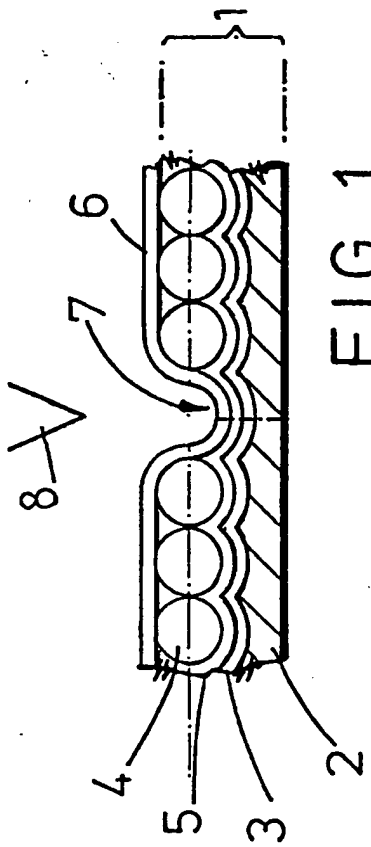

FIG.1

REFLECTIVE MATERIAL

The present invention relates to reflective materials which are useful particularly but by no means exclusively in road safety applications (e.g. for providing a reflective sleeve on a road cone so as to render the cone more visible in the light from a car headlamp during day and night time driving) or traffic signs.

Various constructions of reflective material for use in road safety applications are known in the art which comprise a layer of transparent microparticles (e.g. of glass) behind which is a carrier layer including a specularly reflective metallic coating. One example of such a material is as disclosed in our earlier patent specification No. WO-A-91/06880.

In such reflective materials, it is generally desirable that the layer of microspheres be overlaid by a transparent coating (e.g. of plastics material) to protect the microsphere layer from damage.

According to a first aspect of the present invention there is provided a reflective material comprising a reflective substrate itself comprised of a carrier layer having a reflective facing to which is bonded a layer of transparent microparticles wherein the microparticles are overlaid by a transparent film which has been ultra sonically welded to the substrate.

According to a second aspect of the present invention there is provided a method of manufacturing a reflective material as defined in the preceding paragraph comprising providing a reflective substrate itself comprised of a carrier layer having a reflective facing to which is bonded a layer of transparent microparticles, overlaying said microparticles with a transparent film, and bonding said transparent film to the substrate by ultra sonic welding.

The ultra sonic welding technique may be conducted at a frequency of 20-35 kHz. Suitable ultra sonic welding apparatus for use in the invention is available from Telsonic, e.g. the Telsonic Model 2500.

The transparent film may be bonded to a portion of the carrier layer which extends beyond the reflective facing and microsphere layer (i.e. to a marginal edge of the carrier layer). However we have found that the use of ultra sonic welding allows the transparent film to be bonded to that portion of the substrate having the reflective facing.

This is the preferred embodiment of the present invention and allows disadvantages (set out below) of the prior art to be overcome.

Conventional practice has been to sandwich the reflective material of WO-A-91/06880 between two layers of plastics covering material each of which is larger than the reflective material layer. The facing marginal edges of the covering layers are then bonded together using a high frequency welding technique so that the reflective material is enveloped between the covering layers. The back covering layer may for example be white PVC and the front covering layer (i.e. that overlying the microparticle) may be of clear PVC. This technique (of sandwiching the reflective material between two outer layers) is adopted because difficulty has been encountered in bonding the front covering layer directly to the specularly reflective coating. However, the technique obviously has the disadvantage of requiring the back covering layer and also that the front covering layer must be larger than the reflective material thus involving the use of more material (for the front covering layer) than would otherwise be necessary and that the reflective material has to be precut to shape.

A similar problem exists in relation to other types of reflective material in which a reflective ink is screen-printed on to a carrier layer for being overlaid with transparent microspheres. In this case, it has been conventional practice for the screen-printed ink to be of lesser area than the carrier layer whereby there is a marginal edge around the screen-printed ink. The transparent film is then bonded to this marginal edge. It will be appreciated that this involves the disadvantage of the carrier layer and transparent films both being of somewhat larger area than might otherwise be required.

It is also possible in accordance with the invention for the transparent protective layer to be of substantially the same size as the reflective facing (and microsphere layer) and to be bonded at its extremities to a portion of the substrate underlying the transparent microspheres.

The disadvantages of the prior art associated with the need for the transparent film to be of a larger area than the reflective facing (and microsphere layer) and pre-cutting of the reflective layer are thereby avoided.

It is also possible for the carrier layer (and reflective facing)

together with the front covering layer to be of larger size than the finished reflective material and for the ultra sonic welding procedure simultaneously to effect a cutting and sealing operation whereby an article of the desired size and shape is produced.

The transparent film will generally be a plastics material, for example, PVC ((preferably plasticised PVC). Typically the transparent film will have a thickness of 0.125 to 0.25 mm.

The invention is particularly applicable to reflective materials for which the reflective facing is a metallic layer. Additionally, the carrier layer is preferably a flexible or rigid (most preferably flexible) plastics material. Particularly suitable reflective materials for use in the present invention are those disclosed in WO-A-91/06880 in which the carrier layer has a finely embossed surface and the reflective facing is a thin metallic layer deposited on the embossed surface and being of a thickness such that the exposed surface of the reflective layer follows the contours of the embossing.

The invention is also applicable to materials in which the reflective facing is a metallic ink printed (e.g. by screen printing) onto a carrier layer).

Preferably, the weld between the protective layer and the reflective facing is along a relatively narrow line which outlines the shape of the final article being produced.

The invention is particularly applicable to the production of "flats" of a generally trapezium-like shape which may be folded to define a frusto-conical sleeve for a road cone.

The invention will be further described by way of example only with reference to the accompanying drawings, in which:

Fig. 1 is a schematic cross-sectional view (to an enlarged scale) of a reflective material after ultra sonic welding;

Fig. 2 illustrates a road cone sleeve; and

Fig. 3 illustrates a shape (not to scale) for producing the sleeve of Fig. 2.

Fig. 1 illustrates a reflective substrate 1 of the type described in WO-A-91/06880 which comprises a finely-embossed plastics (e.g. PVC) carrier sheet 2 provided with a reflective facing 3 of a metallic layer to which glass microspheres 4 are bonded by an adhesive layer 5.

Provided over the microspheres 4 is a protective PVC layer 6

which is bonded along an ultra sonic weld line 7 to the underlying substrate. For convenience, the film is shown as being bonded to the reflective layer 3 but in practice may be bonded through the reflective layer 3 to the carrier sheet 2. The weld line 7 is depicted as being formed by an ultrasonic welding head 8 operating at, for example, 20 kHz-35 kHz. The dashed line in Fig. 1 is intended to illustrate simultaneous severing of the material.

The invention is particularly applicable to the production of frusto-conical reflective sleeves for a road cone. A "flat" for such a sleeve is illustrated generally in Fig. 2 and depicted by reference numeral 9.

To produce the "flat" 9, the head 8 is moved to define a generally trapezium-like shape for the weld line 7 (see Fig. 3). In Fig. 3, the area bonded by weld line 7 is depicted as being formed in an overall larger area of the reflective material 1 and PVC layer 6. The welding head 11 serves simultaneously to form the weld line 7 and sever the material (as depicted by the chain-dot line) whereby the desired trapezium-like shape is cut from the larger area of material.

The "flat" can then be folded into the frusto-conical shape depicted in Fig. 2 and the edges ultra sonically welded together to form the finished sleeve.

CLAIMS

1. A reflective material comprising a reflective substrate itself comprised of a carrier layer having a reflective facing to which is bonded a layer of transparent microparticles wherein the microparticles are overlaid by a transparent film which has been ultra sonically welded to the substrate.

2. A material as claimed in claim 1 wherein the transparent film is a plastics material.

3. A material as claimed in claim 2 wherein the transparent film is PVC.

4. A material as claimed in claim 3 wherein the transparent film is plasticised PVC.

5. A material as claimed in any one of claims 1 to 4 wherein the transparent film has a thickness of 0.125 to 0.25 mm.

6. A material as claimed in any one of claims 1 to 5 wherein the carrier layer is an embossed plastics material.

7. A material as claimed in any one of claims 1 to 6 wherein the reflective facing is a metallic layer.

8. A material as claimed in any one of claims 1 to 5 wherein the reflective layer is an ink.

9. A material as claimed in any one of claims 1 to 8 wherein the transparent film is bonded to the carrier layer through the reflective facing.

10. A material as claimed in any one of claims 1 to 9 which is a "flat" for forming a road cone sleeve.

11. A road cone sleeve formed of the material claimed in claim 10.

12. A method of manufacturing a reflective material as defined in the preceding paragraph comprising providing a reflective substrate itself comprised of a carrier layer having a reflective facing to which is bonded a layer of transparent microparticles, overlaying said microparticles with a transparent film, and bonding said transparent film to the substrate by ultra sonic welding.

13. A method as claimed in claim 12 wherein the ultra sonic welding is effected at a frequency of 20-35 kHz.

14. A method as claimed in claim 12 or 13 wherein the transparent film is a plastics material.

15. A method as claimed in claim 14 wherein the transparent film is

PVC.

16. A method as claimed in claim 15 wherein the transparent film is plasticised PVC.

17. A method as claimed in any one of claims 12 to 16 wherein the transparent film has a thickness of 0.125 to 0.25 mm.

18. A method as claimed in any one of claims 12 to 17 wherein the carrier layer is an embossed plastics material.

19. A method as claimed in any one of claims 12 to 18 wherein the reflective facing is a metallic layer.

20. A method as claimed in any one of claims 12 to 16 wherein the reflective layer is an ink.

21. A method as claimed in any one of claims 12 to 20 wherein the transparent film is bonded to the carrier layer through the reflective facing.

22. A reflective material substantially as hereinbefore described with reference to the accompanying drawings.

23. A method of producing a reflective material substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number
GB 9212640.8

Relevant Technical fields

(i) UK Cl (Edition L) B5N, G5C (CGAB)

(ii) Int Cl (Edition 5) B32B, E01F, G02B, G09F

Search Examiner
R J MIRAMS

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI, CLAIMS

Date of Search
16 SEPTEMBER 1993

Documents considered relevant following a search in respect of claims 1-23

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Published 1993 at The Patent Office, Cardiff Road, Newport, Gwent NP9 1RH. Further copies may be obtained from